

Need/Opportunity Title: Deep Well Sampling

Need/Opportunity ID No: NV02-0001-02S

Date:

Need/Opportunity Description: A cost-effective well design and sampling technology is needed for sampling groundwater for radionuclides and other physical and chemical parameters in deep (up to

1,500 meters) wells in remote areas. Sampling should be unaffected by well design or well materials. Current methods may perturb the *in situ* conditions enough that low concentrations may be unrealistically detected which impacts risk assessments.

Need/Opportunity Category: Science Need

Science Need Description: Research is needed to develop a sampling technology that does not adversely affect solution chemistry and cause dissolution of colloids. At the low groundwater flow velocities associated with groundwater movement beneath the Nevada Test Site (NTS), purging of wells may result in dissolution of adsorbed contaminants and colloids that may contain adsorbed radionuclides. This dissolution can mobilize what otherwise would have been immobile radionuclides and result in overestimation of the potential for radionuclide transport.

Operations/Field Office: DOE/NV

Site: NTS

End User Program: Environmental Restoration Division (ERD)

Priority Rankings:

End User Program Ranking: 2 of 2

ACPC Priority: 2

Site Wide Ranking: 1 of 13

PBS Number/Title: NV212/Underground Test Areas

WBS Number: 1.4.1.2.1.2

Waste Stream: RAD Contaminated Groundwater (01209)

Background: The current system involves pumping large volumes of water from deep wells with either dedicated pumps or pumps installed for each sampling. The installation of pumps for each sampling requires a drill rig or similar equipment that is very expensive to operate. Considerable decontamination of equipment is required. The pumping produces considerable volumes of contaminated water that may require disposal as radioactive waste. The monitoring is envisioned to last for the next 100 years.

“Baseline” Technology Process: The current system involves pumping large volumes from deep wells with either dedicated pumps or pumps installed for each sampling. The installation of pumps for each sampling requires a drill rig or similar equipment that is very expensive to operate. Considerable decontamination of equipment is required. The pumping produces considerable volumes of contaminated water that may need to be disposed. The monitoring is envisioned to last for the next 100 years.

Cost: The conceptual cost estimate is \$244 million in present day dollars. This cost will be updated as more information becomes available.

How Long Will it Take: One hundred years beginning in 2006.

Issues Related to Baseline:

Technical: A technology is needed for sampling of groundwater at great depths in remote areas.

Cost: The cost savings is estimated to be around \$90 million over a 100-year monitoring period in present day dollars.

Regulatory: The monitoring system is required as part of an agreement with the state of Nevada (the Federal Facility Agreement and Consent Order).

Safety, Health, and the Environment: Worker safety and health will be increased by limiting the installation of pumps and radiation exposure.

Stakeholder and Cultural: The perceived risk and public concern regarding water quality will be reduced.

Other: None.

Need/Opportunity Description: Research is needed to develop a sampling technology that does not adversely affect solution chemistry and cause dissolution of colloids. At the low groundwater flow velocities associated with groundwater movement beneath the NTS, purging of wells may result in dissolution of adsorbed contaminants and colloids that may contain adsorbed radionuclides. This dissolution can mobilize what otherwise would have been immobile radionuclides and result in overestimation of the potential for radionuclide transport.

Functional Performance Requirements: The requirements include: 1) collecting approximately four liters of water from depths of up to 1500 meters, 2) minimizing the volumes of fluid removed from the well, 3) demonstrating that the sample is representative of the actual conditions, and 4) easily decontaminating the equipment between samples.

Schedule Requirements: A deployable system beginning in 2002.

Consequences of Not Filling Need/Opportunity: Without the technology, there would be higher costs and a greater potential to expose workers during sampling and decontamination activities. Also, considerable volumes of contaminated water would need to be disposed.

Contractor End User Point(s) of Contact: David Shafer, Desert Research Institute, Office: 702-295-0564, Fax: 702-295-0427, E-mail: dshafer@dri.edu

DOE End User Point(s) of Contact: Bruce Hurley, ERD, Technology Facilitator, Office: 702-295-1284, Fax: 702-295-1113. E-mail: hurley@nv.doe.gov